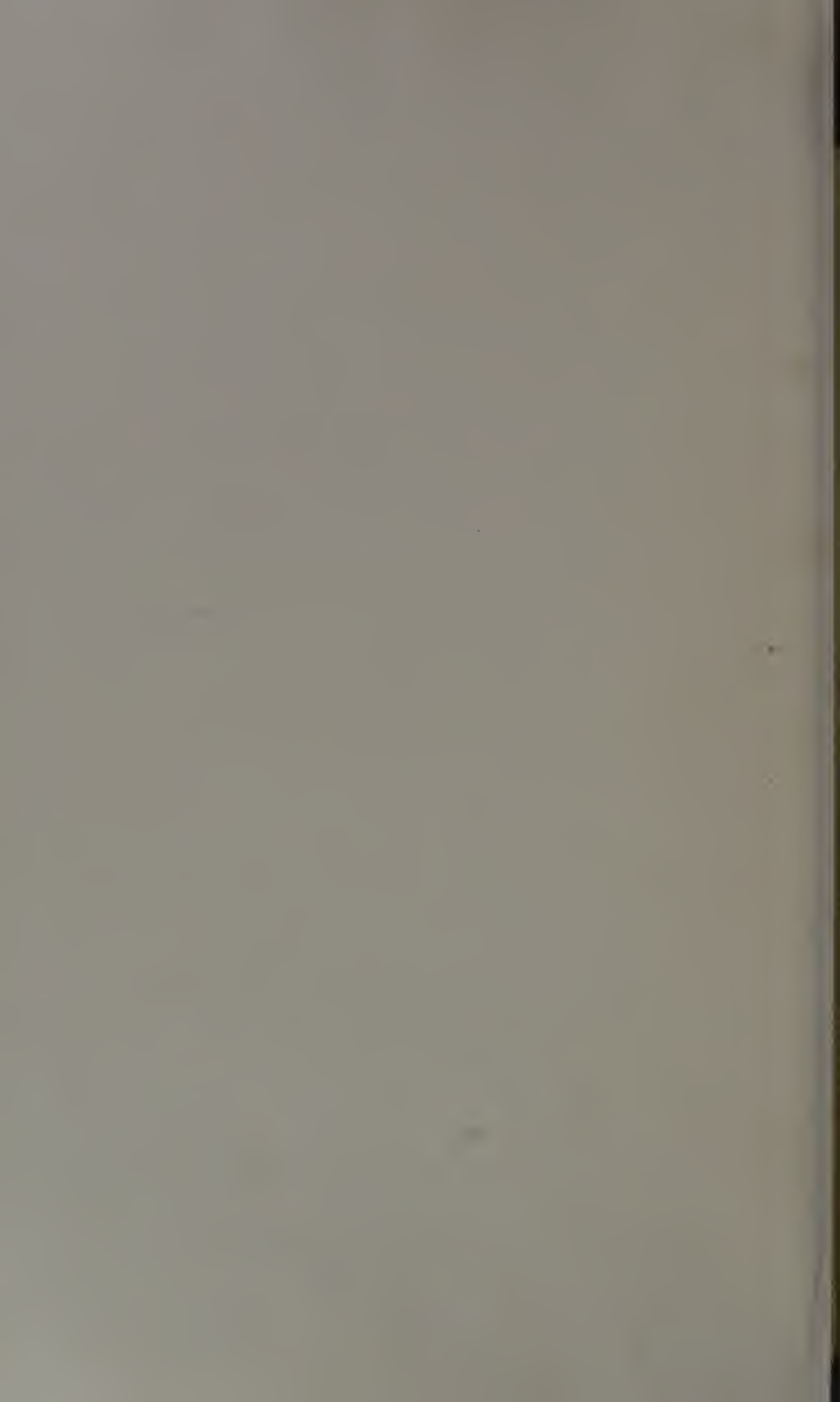


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OBSERVATIONS
UPON THE MODES OF TREATMENT OF
PLEURISY WITH EFFUSION
WITH SPECIAL REFERENCE
TO THE
THERAPEUTIC VALUE OF THORACENTESIS.

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P R E F A C E.

MORE than four centuries before the commencement of the Christian era, a disease, characterised by fever and severe pain in the side, had been differentiated from other morbid states, and had received the name Pleurisy.

That Hippocrates had a good knowledge of this disease, is beyond doubt ; for he has left precise directions for its proper treatment.

Yet his clinical methods of examination were, as we know, very crude ; for we find him saying,¹ “ That none of these diseases are to be expected before puberty.” He then mentions a number of diseases, and amongst others Pneumonias and Pleurisies !

But, however faulty his methods of clinical examination may have been, his extraordinary powers of observation led him to follow a mode of treatment which is essentially the same as that now followed by many physicians. That he must often have missed Pleurisy when it was really present, and have diagnosticated it when it did not exist, is more than probable. But yet his observation taught him to believe, as he says in his “ Prognosticks,” that a sharp pain in the side, accompanied by long fever, would most likely end in pus ; and it also taught him that an empyema of the left side was more likely to recover than one on the right side.

Quite lately, Dr Cheadle² has published the records of thirty-three cases of empyema, sixteen of which were right empyemas and seventeen were left ; of the former only seven recovered,

¹ “ Of Air, Water, and Situation.”

² “ *Lancet*,” vol. ii. 1881, page 786.

and of the latter fifteen recovered. He further stated that it was his experience that an empyema of the right side was less apt to recover than one on the left, and appeared to take some credit to himself for being the first physician who had pointed out this very remarkable clinical fact. Aran made much the same observation, however, about the year 1860, and we also have seen that the fact had been perfectly well known to the Father of Medicine nearly twenty-three centuries ago.

The sagacity of Hippocrates may have often saved him from error; but those who came after him must frequently have gone astray in diagnosing the disease of Pleurisy.

Galen distinguished Pleurisy from Pneumonia and Peripneumonia. But, in much later times, Sydenham was doubtful of the pathology of the disease; and our famous countryman Cullen believed it was an inflammation of the lung. He divided Pleurisy into simple Pleurisy, combined Pleurisy, symptomatic Pleurisy, and false Pleurisy, thus leading one to suspect that he had not differentiated Pleurisy from Pleurodynia.

It was a Frenchman, Phillipe Pinel, who first pointed out that Pleurisy was a serous inflammation.

But it was reserved for the genius of another Frenchman, René Laennec, to place the pathology of Pleurisy on a satisfactory basis, and to lay down precise rules by which the disease might be diagnosed. However much modern science may have modified some of Laennec's views, the broad lines of his teaching are still adhered to.

No disease has, perhaps, been treated in a greater variety of ways than Pleurisy. Some have attempted, as we shall see, to remove the fluid exudation from the pleural cavities by means of sudorifics. This form of treatment was pursued by Paracelsus, and at the present day has found its advocates in Bartholow, Brakenridge, and others, who have exhibited Jaborandi as a diaphoretic agent. Drastic purgatives were advocated by Sydenham, and have often been employed. Withdrawal of the fluid by diuretics has always been, and is still, the plan followed by a

large body of physicians. The employment of that powerful diuretic, digitalis, we owe to the earnest advocacy of Erasmus Darwin.

Mercury and iodide of potassium in later times have been largely employed, on account of their action on the absorbents, an action denied by some, but believed in by many.

Counter irritants, in some form or other, have been employed from the earliest times.

Bloodletting, sometimes to a large extent, held a dominant position for many centuries in the treatment of Pleurisy, and its memory is still fondly cherished by some physicians of the older school.

Paracentesis Thoracis by the cautery, trepan, or knife was advocated by Hippocrates. Of these methods the cautery fell into disuse in the eighteenth century. Trepanning a rib was revived by a French surgeon in our own time.

The use of the trocar instead of the knife was first advocated by Drouin in the sixteenth century.

Thoracentesis, though practised occasionally for many centuries, was yet looked upon as a dangerous operation, and one not to be employed except as a *dernier resort*.

Trousseau in France and Bowditch in America have, however, not taken such a gloomy view of Thoracentesis, and have urged physicians to resort to it much more generally than it had formerly been thought right to do.

Both these physicians base their support of a more general practice of Thoracentesis upon the entire absence of any danger in the operation. Bowditch goes so far as to say that there is no more danger in Thoracentesis than in Vaccination or Venesection.

It was that I might form for myself some real opinion concerning the different modes of treating Pleuritis with effusion, and also that I might see for myself the exact value of the confident assertions of Trousseau and Bowditch (I had been led to doubt the accuracy of their statements by knowing that my

former teacher, the lamented Professor Sanders, had lost a patient while performing the operation of Thoracentesis) that the following enquiry was instituted, and if my study of the different modes of treatment of Pleuritis has led me to adopt views about Thoracentesis, which are at variance with those entertained by the generality of writers on Pleurisy, I trust, nevertheless, that the arguments I shall bring forward in support of my opinions, may be deemed not unworthy of serious consideration.

IN instituting an inquiry into the different modes of treatment, that have been, or are at present in use, for the relief of Pleuritis with effusion, the attention of the inquirer is at once arrested by one method of treatment, Paracentesis Thoracis, or the puncturing of the thorax and withdrawing the fluid from the pleural cavity. This plan was recommended, and apparently practised, by Hippocrates. It has been revived in modern times, and is, at the present day, advocated by many physicians in the most enthusiastic, not to say dogmatic manner.

It is more particularly to the question of the therapeutic value of the operation that I purpose to limit myself in this thesis. And in proceeding to discuss the subject, it will be most convenient to do so, in reference to the advantages claimed for it by its supporters. These may be held as resolving themselves into two main points.

(I.) *Certain beneficial results to be derived.*

(II.) *Certain dangers to be obviated.*

I shall therefore have to consider whether these alleged advantages are so great as the supporters of Thoracentesis would have us believe; or whether the supposed dangers to be obviated, have sufficient clinical importance to justify the operation; and, on the other hand, whether there are not certain dangers, both immediate and remote, liable to follow the operation, which, if they are proved to exist, must always prevent Thoracentesis from becoming a routine practice, for the relief of Pleurisy with effusion. I say routine practice, for that this operation is not only justifiable, but absolutely essential, to the saving of life, in some rare instances, I freely admit. What I do aver is, that in most instances of the malady in question, Thoracentesis is unnecessary.

Having attempted to estimate the therapeutic value of Thoracentesis, I shall then attempt to compare the results obtained by other methods of treatment.

I have first to consider the so-called advantages of Thoracentesis. The immediate object of the operation is to relieve the compression of the lung by the effused fluid, and to allow it to re-expand.

Every person who has witnessed the operation of Thoracentesis, where successful, must be ready to admit the immediate and distinct relief it affords to some of the symptoms of the patient. The severity of the dyspnœa, when present, is mitigated ; I say when present, for a man may have an enormous amount of fluid in the pleural cavity, without any particular feeling of breathlessness.¹ Whether this relief experienced, in consequence of the operation, is permanent or not, does not at present concern us.

But it does concern us, perhaps, in this connection, to point out that the general tendency of modern medicine is to attempt to treat the disease, and not the mere symptoms of the disease ; and no one has yet, I believe, attempted to prove that Thoracentesis has any remedial effect upon the disease Pleuritis.

So far, then, it may be conceded that the operation under discussion, to a certain extent, fulfils the expectations of its advocates. But, on the other hand, it can hardly be denied that the relief afforded by the operation is only, as a rule, temporary. I say as a rule, for even such an ardent advocate of Thoracentesis, as Trousseau says,² " I have no objection to admit that effusion may be reproduced to such an extent as to necessitate a repetition of the tapping." But he qualifies this concession by adding, " But what objection can there be to the repetition of an operation which is absolutely without danger."

This question of danger, attending the operation, will fall to be considered farther on, for unquestionably it is upon this that much of the therapeutic interest and importance of the question turns. If Trousseau is right in saying that there is no danger in the operation, then I say it is inconceivable, why physicians should ever pause before having recourse to Thoracentesis ; it should, in fact, be the routine practice, for the relief of pleuritic effusion. If, however, it can be shown, and I think it can, that distinct dangers, both immediate and remote, attend the operation of Thoracentesis, while the relief afforded by it is not permanent ; then, I contend, that even under my first heading, Thoracentesis

¹ For an instance of this, see Appendix, Case 36.

² "Clinical Medicine," vol. iii., p. 283.

does not carry out the spirit of its promise, though it appears to do so in the letter.

In his classical work on "Diseases of the Lungs,"¹ Dr W. H. Walshe observes, "The continuance of the secretion from the pleural surface, for a greater or less period, and hence the constant renewal of empyema, is of very common occurrence." Walshe uses the word empyema as signifying a fluid collection in the pleural sac.²

In Flint's "Principles and Practice of Medicine,"³ we learn that Bowditch operated 250 times on 154 patients. Such statements appear to me to warrant the observation, that the relief afforded by the operation is, as a rule, only temporary; when we find that, in 154 patients, the operation was performed on an average 1·7 times on each one of them.

Fraentzel, author of the elaborate article on Pleurisy in "Ziemssen's Cyclopædia," might also be quoted in this connection; but the three authorities I have already brought forward are surely sufficient to prove the correctness of my assertion, that the relief afforded by operative interference is, as a rule, only temporary.

I am tempted, before passing on to the second part of my subject, to compare for a moment the recourse to Thoracentesis, for the relief of symptoms due to pleuritic effusion, to the use of alcohol as a therapeutic agent. There doubtless are times, in certain cases of pleuritic effusion, when life can only be saved by Thoracentesis; as there are cases in other diseases, when collapse sets in, for instance (one such case is indelibly fixed in my memory), where all therapeutic agents fail entirely to sustain life except alcohol in large doses. But while I own the value of alcohol in such extreme cases, no physician I suppose would dream of ordering alcohol for the relief of mental or bodily depression, symptoms which, it is well known, may be relieved, not perhaps so instantaneously, but, on the other hand, more permanently and with less danger, by other therapeutic agents. So with Thoracentesis, if death is imminent, it may be the only means of saving life; but why have recourse to it in less urgent cases, in which a cure may be effected by other means, not perhaps so rapidly, but with far less risk to the patient.

To proceed to a consideration of the alleged dangers to be obviated by Thoracentesis. These bear reference to the presence

¹ P. 288.

² See Note at p. 278.

³ P. 146.

in the thoracic cavity of a large effusion, and are chiefly the following four :—

1. *Sudden death.*
2. *Conversion of serum into pus.*
3. *Collapse and carnification ; and*
4. *Consumption.*

We shall look at these a little in detail, viz.—(1) *Sudden death* may occur in patients who are suffering from pleuritic effusion, as has been noted by several observers, amongst others Trousseau, who says,¹ “ it is not unusual for persons with extensive pleuritic effusion to sink all at once. . . . Death takes place from syncope.”²

The fact that sudden death, under the circumstances, does sometimes occur is incontestable ; but such occurrences are by no means universally regarded as depending on the amount of effusion ; for such a high authority as Becker³ asserts most strongly that these sudden deaths are not due to the large amount of fluid in the pleural cavity, but that they are rather the result of the antecedent pleuritis which has produced fatty degeneration of the heart.

West, in his “ Diseases of Children,” says,⁴ “ In most of these cases (*i.e.*, of sudden death), however, which I have seen terminate fatally, the disease, though it began in the pleura, did not continue limited to it, but extended either to the pulmonary substance or the pericardium.”

Thus, though West but indirectly supports Becker, he nevertheless appears directly to oppose Trousseau’s idea, that the sudden death is due merely to the presence of fluid, in the pleural cavity.

The only case of sudden death that is in my own knowledge occurred in a case of empyema.⁵ In this patient the *post-mortem* revealed serious pericardial mischief.

(2) *Conversion after a lapse of time of a serous into a purulent collection.*

This has been asserted by nearly, if not all, writers on Pleurisy ;

¹ “ Clinical Medicine,” vol. iii., page 221.

² Walshe, “ Diseases of the Chest,” page 284.

³ “ Berliner Kleinische Wochenschrift,” vol. ii. 1874, page 514.

⁴ Page 372.

⁵ See Appendix, 37.

but I have not succeeded in finding any evidence to show that it is true, and *a priori* it is difficult to understand by what means a serous effusion in an air-tight sac could become purulent, unless its presence in the pleural sac kindled anew the inflammation of the pleural surface, and thus caused an effusion of pus. Every pleural effusion is composed of four constituents, namely, serum, fibrin, red blood corpuscles, and pus cells, and the effusion is called serous, hæmorrhagic or purulent, according to the relative proportion of each of these constituents.¹

Now the effusion having taken place into the pleural cavity, and being serous, it is difficult to understand where the pus could come from. The serum itself could not be converted into pus, the red blood cells, that are normally present in the effusion, could hardly be expected to turn into Leucocytes. If, however, a fresh inflammation is set up in the pleura, of course the result may be a purulent effusion.

Dr Smith, in his work above alluded to, says² that "the change in the fluid, from a serous to a purulent one may be observed by the use of, the hypodermic syringe, at different periods." I am quite ready to admit that such a phenomenon might be observed; but I am also justified in holding it as open to question, whether this change might not have been brought about by the too free use of a possibly septic hypodermic syringe.

Mr Thompson, surgeon to the Tyrone County Hospital,³ in a very able article on the treatment of Pleurisy, mentions a case in his own practice of a lad who had suffered from acute pleuritis, with effusion, who carried this collection of fluid in his pleural sac for three months. He was treated medicinally, and the effusion was at last absorbed, and the patient ever since has been in excellent health.

Many similar instances could be brought forward, but this one is enough to show that serum may be retained in the pleural cavity for such a long time as ninety days, and yet not shew any tendency to become purulent. It ought perhaps to be added that in the case recorded, Mr Thompson did not add to his patient's discomfort by exploring his thorax with a *hypodermic syringe at different times* in order to see how the fluid was getting on.

¹ L. Smith's "Diseases of Infancy and Childhood," page 596.

² Same, page 598.

³ "British Medical Journal," 12th November 1881, page 773.

Dr West may be counted as against the necessity for Thoracentesis in this connection, though he is not especially referring to the subject at present treated of. In his above mentioned work¹ he says, "I believe that so long as the child's health is improving, or at least not deteriorating, as the temperature has not begun to rise, as respiration is not growing more hurried . . . while measurements of chest prove the effused fluid not to be on the increase, we may persevere in the employment of the means already indicated" (these *means* are certain therapeutic agents he had previously named). Thus, it appears, that Dr West does not consider that there is any particular danger of the fluid becoming purulent, or else, surely, such an able and careful writer would have insisted on the propriety of placing his patients out of the way of such a danger. This he does not do, and therefore I think we have a right to suppose that he does not believe in the existence of the danger. Walshe in his above quoted book² says, "The fluid may be sero-albuminous in cases that have lasted for weeks." See also "case 38" in appendix where we find a patient was tapped on the sixty-second day of the disease, and 45 ounces of serum were drawn off. See also "case 17" of a patient who was discharged from the hospital with fluid unabsorbed in his right pleural cavity, and was seen nine months after in *good health*; but the fluid was unabsorbed, after this long period the fluid was yet evidently not *purulent*.

(3.) *Collapse and Carnification.*

Collapse and carnification of the lung, produced after a time by fibrous bands of lymph binding down the lung, followed by the falling in of the ribs, and consequent deformity of the side. This is one of the results that have to be feared, as a sequela of extensive effusion into the pleural sac; nevertheless the fear of this result alone ought not, I submit, to drive us to the performance of Thoracentesis. An operation which, as will hereafter appear, is attended by both immediate and remote dangers to the patient. But, though I do not wish to deny, that the lung may be bound down permanently by the adhesions, and the side consequently become deformed, yet we have seen from the cases above mentioned, that an extensive effusion may remain in the pleural sac for ninety days, and yet the lung may entirely escape

¹ Page 381.

² Page 275.

without any of the bad results, that the advocates of Thoracentesis insist must happen to it.

Again, let us take the opinion of Dr Ewald, himself an ardent advocate of Thoracentesis.¹ He urges the performance of thoracentesis in order that the patient may avoid, amongst other dangers, the one under immediate discussion, and yet, in the same page he allows that, after being compressed for six months by a pleural effusion, the lung may yet re-expand perfectly.

Again, Trousseau, that ardent apostle of Thoracentesis, declares,² "This deformity of the ribs, which increases and sometimes assumes formidable proportions in young subjects, produces alarm in families. *Dispel their fears* when once the effusion has been cured, the deformity will disappear." Again he continues . . . "You can understand how the lung under the influence of this pressure (that is atmospheric pressure) disengages itself, from the adhesions by which it is confined, and expands sufficiently to resume to a certain extent its place in the thoracic cavity."

So then it appears that even Trousseau regards this thoracic deformity as having very little, if any, clinical importance, and considers that the lung may be expected, as a rule, to overcome the constraining influence of those fibrous adhesions by which it is confined.

Further Dr West in his above quoted book observes:³ "In all cases of effusion into the chest, whether it has been tapped or not, some deformity is sure to take place . . . even when the contraction has at first been most marked, a disposition to its spontaneous removal, almost invariably becomes apparent in a few months, and at the end of a year or two, all traces of it have almost always disappeared."

In the Appendix will be found a good many clinical cases gathered from Medical Journals, &c., which fully bear out the dictum of this eminent physician. Dr Lewis Smith in his above quoted work⁴ says, "I can recall to mind, however, only one case of permanent complete collapse or carnification of lung resulting from Pleurisy." How then, it may fairly be asked, is this happy result brought about? Are we not justified in believing (in fact is there any other possible means of accounting for it) that Trousseau's suggestion is the true one, when he says,

¹ "Medical Times and Gazette," vol. i. 1876, page 362.

² "Clinical Medicine," vol. iii., page 237.

³ Page 388.

⁴ Page 603.

as above stated, "You can understand how the lung under the influence of this pressure, disengages itself from the adhesions by which it is confined." After carefully studying many records of cases and their results, and being supported by the opinion of Trousseau, West, and others, I am tempted to believe that the danger to be apprehended by these fibrous adhesions is not well founded, or at all events, is not of such great clinical significance as some writers suppose.

But again, is the lung itself, after all, invariably so much compressed by the fluid effusion, as many writers seem to suppose? Rokitansky estimates that a normal lung is capable of contracting to one eighth of its usual volume.¹ So that an effusion cannot be said to compress the lung till it occupies at least seven-eighths of the Thoracic cavity. Now it is very difficult to say exactly what amount of fluid would represent seven-eighths of the thoracic cavity. Each lung is enclosed by three walls, one inuscular, one muscular and bony, and one serous. I do not exactly know how the thoracic and serous walls act with regard to the lung in presence of an effusion in the pleural cavity. With regard, however, to the diaphragm, Garland² has shown, that, "as long as the diaphragm is arched upwards it can offer no point of resistance to the injection (pleural effusion), and therefore the latter will be unable to compress the lung upward until the diaphragm is arched downwards." This statement is confirmed by Dr Stone in his Croonian Lectures before the Royal College of Physicians.³ He relates a case, in his own practice, in which the contractility of the lung had not been overcome by a very large effusion, for he withdrew four pints of fluid, and yet the percussion after the operation seemed undoubtedly to show that still there remained a large quantity of fluid in the pleural cavity; therefore we see that such a large effusion as this, where a considerable amount was left in the pleural cavity, even after 80 ounces had been removed, had yet not been sufficient to cause collapse of the lung. Herman in his "Human Physiology"⁴ gives the vital capacity of the lungs as about 3770 cubic centimetres. If we take the half of this amount as giving a rough idea of the vital capacity of each lung (of course this is not quite correct, as the lungs are not the same size, but it is near enough

¹ See Dr Garland of Harvard College, "Pneumono Dynamics," page 61.

² Page 49.

³ "Lancet," vol. ii. 1879, page 418.

⁴ Page 198.

for our purpose), we get 1885 cubic centimetres as the vital capacity of each lung, so that seven-eighths of the vital capacity of each lung may be stated at about 1650 cubic centimetres; therefore if Rokitansky is correct in saying that a lung can contract to seven-eighths of its size, then it follows that 1650 cubic centimetres of fluid can have no compressing influence on the lung at all, for this amount only roughly represents seven-eighths of the vital capacity of a lung, whereas seven-eighths of the absolute capacity of an average lung, would be something very much larger than this.

(4.) *Consumption.*

As regards consumption of the lung as a remote consequence of the continued retention of an effusion in the pleural cavity, such a grave result is conceivable, if the lung were collapsed, and bound down by adhesions, attended by deformity of the chest walls. But we have seen that in the experience of Trousseau and West these conditions of the lung and chest wall are very rarely permanent; so that by their own showing such a grave sequela of pleuritic effusion as consumption must be of very rare occurrence. The rarity of its occurrence is also confirmed by the experience of Dr Dobell, in his work on "Blood-spitting and Lung Disease," in which book he gives a carefully prepared table of cases of phthisis, collected out of 800 cases under his observation. Of these, in 107 cases the history had been carefully made out, and in only *one* of these 107 cases, was the pulmonary consumption the result of a previous pleurisy. This table of Dobell's appears then to show one of two things,—either that Pleurisy is a very rare disease, which is against the experience of all physicians, or that, at any rate in the Royal Hospital for Diseases of the Chest, Phthisis has been found to be a rare, are we not justified in saying an extremely rare, sequela of pleurisy!

It is of course never to be lost sight of that all authorities agree in advocating the recourse to Thoracentesis as a means of saving life in those cases of pleuritic effusion in which death appears imminent, and such cases are doubtless occasionally met with, yet it should be borne in mind that many physicians¹ deprecate the practice of it under other conditions.

¹ At the Clinical Society of London, 24th January 1879, Mr Hutchinson said, "Although formerly strongly advocating paracentesis in pleural effusions, he was coming more and more to rely upon drug-treatment for their absorption."

Having examined at some length the alleged advantages of Thoracentesis in Pleurisy, I shall now proceed to consider whether on the other hand there are not countervailing disadvantages and dangers, which render this operation an undesirable and even a hazardous one. It will facilitate this enquiry if, in the first instance, I cite some clinical cases which plainly shew that Thoracentesis is not always the innocuous method of dealing with a pleuritic effusion, which many of the advocates of the operation would appear to believe.

At a meeting in Paris of the Société Médicale des Hôpitaux,¹ several cases of sudden death following Thoracentesis were recorded, though particulars of these are not given. Dr Besnier relates a case² of a lady on whom he performed Thoracentesis on account of empyema, *dying suddenly* in the middle of the operation—death being the result of nervous shock. Dr Legrou relates a case³ of a patient on whom Thoracentesis was performed to his manifest relief. After the operation he spoke quietly, but suddenly said he felt faint, and died; the *post-mortem* shewing nothing that could account for death. By exclusion therefore death was referred to syncope.

Dr Raynaud relates a case⁴ of a patient on whom Thoracentesis was performed, who died suddenly a quarter of an hour after the operation, in whom *post-mortem* examination revealed nothing that could account for death. Dr Lepine at the same meeting at which the above case was described, referred to two cases of sudden death following on the operation of Thoracentesis, but furnished no details of the cases.

Dr Broadbent relates a case⁵ of a patient on whom Thoracentesis was performed one day at 2 p.m., with great relief of symptoms. The patient suddenly died at 5.30 the same afternoon. The *post-mortem* examination revealed no cause to account for death. Many more such instances might be brought forward, but these already quoted are sufficient to establish the fact that there is actual and direct danger in the operation of Thoracentesis.

In view of these cases it is certainly difficult to understand the exact meaning of the language used by such men as Dr Flint and Trousseau, the former of whom says,⁶ "I can testify in behalf of its innocuousness," and again, "If by an operation trivial with

¹ See Appendix, Case iii. ² See Appendix, Case iv. ³ See Appendix, Case v.

⁴ See Appendix, Case i.

⁵ See Appendix, Case ii.

⁶ See Flint's "Principles and Practice of Medicine," p. 147.

respect to pain and any evil effects," &c. While Trousseau¹ speaks of Thoracentesis "as an operation which is absolutely devoid of danger."

Is not such language on the part of such men likely to engender that levity in approaching the operation, which Fraentzel so justly censures, and to which he attributes so many of the bad results of Thoracentesis.² Other dangers exist, which, if not directly due to the operation of Thoracentesis, at least go to show the risks which attend mechanical interference with the pleural cavity in cases of Pleurisy and empyema.

Dr Valin relates a case³ of a patient on whom Thoracentesis had been performed with marked benefit, and the pleural cavity was then washed out daily with weak carbolic acid injections. After one of these injections, the patient was seized with convulsions, and died in 12 hours. At the *post-mortem* examination nothing was found to account for death; but there was slight fatty degeneration of the heart.

At the same meeting, where the above case was related, Dr Maurice Raynaud reported three similar cases, but the particulars of these cases I have not been able to obtain.

Dr Cayley also reports to the Clinical Society a case⁴ of a patient whose pleural cavity had been washed out nine times, but on the tenth washing the patient was seized with convulsions, and died in 16 hours. The *post-mortem* examination revealed nothing that could account for death. At the same meeting, Dr Cayley referred to three similar cases that had occurred in France. The first died in six hours, the second recovered. The treatment was then resumed, the convulsions returned, and the patient died. In the third case the convulsions passed away, the treatment was resumed, and the patient finally was cured of his empyema.

Post-mortem examinations in the two cases that died revealed nothing that could account for death.

Dr Williams reports a case⁵ of a child who was under the radical treatment for empyema, and who one day fell into convulsions and died. No *post-mortem* in this case was allowed.

Do not such cases as these justify the belief that grave though

¹ "Clinical Medicine," vol. iii., page 285.

² Ziemssen's "Cyclopedia of Medicine," vol. iv., page 712.

³ See Appendix, Case vi.

⁴ See Appendix, Case viii.

⁵ See Appendix, Case vii.

remote dangers may attend the practice of Thoracentesis or other interference with the pleuræ?

But it may be contended that such cases as those that have been detailed are of rare occurrence. Let it be granted that they are, still they exist, and therefore teach us that the dictum of Trousseau, Flint, and others that the operation of Thoracentesis is absolutely without danger must be set aside as inaccurate and very misleading. But there is another distinct danger attending the practice of Thoracentesis which is by no means of rare occurrence, and that is, that, after a sero-fibrinous effusion has been drawn off by the operation of Thoracentesis, the new effusion that collects in the pleural sac has a great tendency to take on a sero-purulent form, and thus a Pyothorax results—a grave complication of the disease.

Trousseau, at page 284 of his before-quoted work, makes light of this fear, and declares that the suggestion of such an argument is “An indication of bad faith or of unpardonable ignorance.” But, in the same page, he allows that two such men as Watson and Stokes believe that this grave result may follow the operation. In spite of laying myself open to the charge of “unpardonable ignorance,” I will bring forward records of clinical cases and the opinions of various writers in support of the assertion that effusions are apt to become purulent after Thoracentesis. Fraentzel says ¹ . . . “After a rapid evacuation, not only may the effusion very quickly increase in volume but it may also become purulent.” Again he says ² . . . “and two other cases in which, notwithstanding the most careful disinfection of the trocar carried out by myself, and the greatest caution in the performance of the operation, the effusion became purulent.” But the evidence of Walshe is even stronger than that of Fraentzel, for he says in his above-quoted work, “In rare instances the characters of the newly secreted fluid remain those of that originally evacuated. In the great majority they change, the general tendency of the change being to the purulent character. The alteration from the almost purely serous appearance to the purulent is sometimes accomplished in 24 hours.”

The two physicians just quoted are not generally believed to be “unpardonably ignorant,” and yet their experience leads them to differ from Trousseau. Dr Becker, in the periodical above-

¹ Ziemssen's “Cyclopædia of Medicine,” vol. iv., page 711.

² Idem, page 712.

³ Page 288.

quoted, is strongly of opinion that the effusion after the operation is very apt to become purulent, and instances it by a case which he describes in detail, in which the patient died.

I will now relate several clinical cases, collected from the literature of the subject.

Dr Thompson, already quoted, records a case¹ in which he performed Thoracentesis, and drew off 108 ounces of serous fluid. The fluid reaccumulated, and he again tapped the chest, and drew off 168 ounces of purulent fluid.

2nd Case recorded in the "Medical Times and Gazette."² A patient aged 26 years, on whom Thoracentesis was performed and serous fluid was drawn off. In a very short time it was considered necessary to tap the chest again, but the fluid that was now drawn off was purulent.

*3rd Case.*³ George P. was tapped, and 50 ounces of clear serum were drawn off—the fluid reaccumulated—he was again tapped, and this time the fluid was purulent. After repeated tapplings, he finally died of exhaustion. The aspirator was used in the early tapplings in this case.

*4th Case*⁴ is reported by Trousseau. The patient was so ill that the Professor "hesitated to operate for fear of producing a more violent inflammation than that now existing," so then it appears that this "operation that is absolutely without danger" has yet the power of setting up an inflammation. Which of Dr Trousseau's opinions are we to receive? for the two are diametrically opposed, and so we cannot receive both of them. I think we are surely bound to follow the counsel of the wise physician at the bedside, who "hesitated to operate," rather than be led by the brilliant lecturer, who, in the heat of argument, uses words which in cooler moments his clinical judgment does not appear to justify. In the above case Trousseau, finally, did operate and drew off "a quantity of serosity." The patient died, after six weeks, of hectic fever, and the autopsy revealed the presence of pus in the pleural cavity. It is surely not necessary to multiply instances. No one, in spite of Trousseau, would surely deny that the reaccumulated fluid often becomes purulent; when they find that two such men, as Fraentzel and Walshe, declare that their experience has shewn them that such an event is

¹ See Appendix, Case xv.

² See Appendix, Case xiv.

³ See Appendix ("Medical Times and Gazette"), Case xvi.

⁴ See Trousseau's "Clinical Medicine," vol. iii., page 251.

probable—and Fraentzel shews that the purulent form of the re-accumulated fluid, in his two cases, was certainly not due to the want of antiseptic precautions. But according to Becker, in his article above quoted, the purulent form, in which the fluid re-accumulates, is not due to septic influence; he rather believes that it results from the friction of the inflamed pleuræ against each other. His argument taken generally is as follows—We have the pleuræ in a state of inflammation; but the pleural cavity is more or less distended by an accumulation of fluid, by which the pleuræ are kept apart, and more or less in a state of rest. If we now allow things to take their course, the inflammation subsides, the lymphatics regain their tone, and absorption ensues. If, on the other hand, we perform Thoracentesis, we by this means draw off the distending fluid; and thus bring the inflamed pleuræ into sudden apposition. They cease to be in a state of rest—they are rather thrown into a state of constant motion; by which means their already inflamed state is very greatly aggravated, and a purulent exudation results, with all its evil consequences.¹

Fraentzel, though he does not apparently quite agree with Becker as to the exact mechanism by which the purulent exudation takes place, for he says it is due to certain changes, “not yet fully explained in detail,” certainly agrees with him in not attributing the change to septic influences. He says, “The vessels in the inflamed pleuræ are precisely, on account of the inflammation, abnormally distended, and in consequence of certain changes in their walls, not yet fully explained in detail, are especially prone to permit the emigration of lymph corpuscles.”

In support of Becker’s view that the purulent reaccumulation is due to the violent inflammation set up in the pleura; may not, perhaps, be brought forward the greater frequency with which empyema occurs in children than in adults. May it not be argued that this peculiarity of children is due to the greater violence of the inflammation in their pleural membranes.

Dr Smith, in his above-mentioned work,² records two remarkable *post mortem* examinations in infants, exemplifying the violence of this inflammation, in which “not only was pus found

¹ Becker’s Article in the “Berliner Klinische Wochenschrift.”

² Page 598.

in the pleural cavities, but actually under the pleura, without any loss of integrity in the pleura." This state he believes was due to the violence of the inflammation.

A physician who, not long ago, was pathologist to the Royal Edinburgh Infirmary, tells me that while he was pathologist, he never saw, in the adult, any case in which such violence of inflammation appeared in the pleura, as is recorded above in Smith's cases.

A priori, have we not a right to believe that the inflammation is likely in children, in idiopathic Pleurisy, to be more violent than in adults? For in adults, Pleurisy occurs in robust subjects, just as frequently as in others. Whereas in children, Smith's experience teaches him that¹ "a larger proportion of cases occur among the children of the city poor, than among those who are well nourished," for in the former cachectic and anti-hygienic conditions prevail more abundantly than among the latter."

Again, children have less inhibitory power to enable them to resist an inflammatory process than adults have. I was interested to observe that in a very able and thoughtful lecture, on "A Cold," delivered by Dr Affleck, under the auspices of the Edinburgh Health Society, he states that adults do undoubtedly possess an inhibitory power, by which they are able to resist the evil effects of exposure. And it is a historic fact that the Covenanters boasted that not one of them had ever suffered in health from attending a bill conventicle. This they attributed to Divine interposition. The modern physician, however, is apt to believe that their exemption from disease was rather due to intense mental excitement, which acted as an inhibitory power against the evil effects of hunger, cold, and wet.

I have, however, not been able to make out, in support of my argument, that inflammation, in the knee-joint for instance, has any greater tendency to lead to a purulent accumulation in children than in adults. But I believe, however (and the belief is shared by most physicians I have consulted), though I cannot discover any statistics on the subject, that inflammation of the meninges is more liable to lead to a purulent accumulation in children than it is in adults. Perhaps, however, the purulent accumulation in children and in adults, as a rule may, on the other hand, not be due actually to the inflammatory state, but

¹ Page 590.

may be rather due to a violently inflamed pleura, acting on the branches of the Sympathetic. Luschka has shewn¹ that the pulmonic pleura is supplied by the vagus at the root of the lung, and that the parietal pleura is supplied by the intercostal branches of the spinal cord and branches of the Sympathetic. Now Claude Bernard has shewn² that in an animal the health of which has been previously lowered, he could produce directly pleuritis, with purulent deposit, by the simple division of the great sympathetic nerve. In order to insure the success of this experiment it is absolutely necessary that the condition of the animal's health should be previously lowered.

Now have we not in children the very state indicated by Claude Bernard? The children in whom empyema occurs are badly nourished cachectic children. An inflammation is set up in their pleura, causing perhaps irritation, and then paralysis of the branches of the sympathetic, and a purulent exudation is then poured out into the pleural cavity. Trousseau points out³ that in women recently delivered, "a pleurisy, which in ordinary circumstances would have been a simple pleurisy, becomes purulent." Have we not here again the conditions demanded by Claude Bernard's experiment? A debilitated animal, an inflamed pleura, acting on the branches of the sympathetic, and as a result a purulent exudation is poured into the pleural cavity. Dr Ewald⁴ gives it as his opinion that the chest should not be punctured till between the third and fourth week after the commencement of the disease, for he believes that then the operation will not be followed by a purulent reaccumulation. And though Ewald does not enter into any explanation, it is evident that he believes that the inflammation of the pleura will have subsided by this time; and he also appears to be of opinion that if the inflammation is still present in the pleura, then by some means or other, which he does not explain, there is a probability of a purulent reaccumulation following the operation of Thoracentesis. It is very interesting in this connection to find that Hippocrates⁵ laid down that puncture of the chest should not be had recourse to until the fifteenth day of the disease. And now to return to the adult. Thoracentesis is performed, and the

¹ "British and Foreign Med. Chir. Rev.," vol. ii. 1853, page 346.

² "Medical Times and Gazette," vol. i. 1860, page 55.

³ Page 230, "Clinical Medicine," vol. iii.

⁴ "Medical Times and Gazette," vol. i. 1876, page 362.

⁵ Dr Beggie's Address to B. M. Association: "Lancet," vol. ii. 1875, page 195.

patient deprived of an enormous quantity of albumen, is necessarily greatly reduced in his general condition. Now, the inflamed pleuræ rubbing against each other increase their already existing inflammatory state, and the branches of the Sympathetic become irritated and then paralysed, and a purulent exudation results. There is again another point which tells against the practice of Thoracentesis, namely that the serous effusion in Pleurisy is very rich in albumen. Supposing Thoracentesis is performed, all this albumen is taken from the patient. In those rare cases, in which no reaccumulation takes place, it may perhaps be urged that no very great harm is done by taking this amount of albumen away, for by nourishment, &c., the system will soon recover its equilibrium; but we have seen that in 154 cases Bowditch operated 1·7 time on each patient, so that we are justified in saying that most likely a reaccumulation will take place, and granted that this reaccumulation is serous (though we have seen that there is a great probability of its being purulent) the patient is again, in his already debilitated state, deprived of another enormous quantity of albumen. This we again draw off. Have we by this heroic treatment given our patient a better chance of regaining his strength than if we had treated him medicinally, and had by appropriate drugs removed the water from him, but had left him the albumen? The advocates of Thoracentesis are so enthusiastic that as long as they quickly get rid of the fluid in the pleural cavity they appear to be entirely satisfied with the result of their operation, and give us no account of the after-condition of their patients. On the other hand, patients treated medicinally, though they may perhaps be a little longer under treatment, are discharged from hospital, not only cured of their disease, but well, and fit for their work; for under medicinal treatment every ounce of effusion that is absorbed from the patient's pleural cavity conveys a certain amount of albumen back into the system. I recall a case in which I performed Thoracentesis on a very anæmic woman. She had lately been confined, and had suffered from pretty severe *post-partum* hæmorrhage. Eighty ounces of serous fluid were drawn off from the patient; but the fluid at once reaccumulated. She would not allow a second operation, and left hospital in an exceedingly weak condition. Surely was not this a case in which the danger of profound anæmia following operative interference was much greater than any danger to the patient from the presence of the effusion in the pleural cavity. And now I will briefly re-

capitulate the points I have above discussed. We have seen that the statements of Trousseau and Flint that the operation of Thoracentesis is absolutely without danger, are directly disproved by the fact that many deaths have occurred after the operation; and as the *post-mortem* examinations showed that no cause existed that could account for death, the deaths were by exclusion referred to the effect of the operation.

The recorded cases of deaths and convulsions in those patients who were undergoing the radical treatment for empyema are certainly very mysterious; but though they cannot be allowed to shake one's faith in the propriety of the radical treatment in empyema, still they serve to show that the dangers which attend interference with the pleural cavities are many and very grave. Again, in spite of the *ex cathedra* statement of Trousseau, I believe I have brought forward sufficient evidence to show, firstly, that if the effused fluid is drawn off by Thoracentesis, in all probability it will again reaccumulate, for we have seen that on 154 patients even Dr Bowditch performed 250 operations. And secondly, that there is a great tendency, in spite of all precautions, for this reaccumulated fluid to be purulent. And surely the bare possibility, to say nothing of the great probability, of lighting up, in a patient, such a very grave disease as empyema, ought to make the physician pause before having recourse to an operation which, however brilliant its results may frequently be, has yet undoubtedly caused many deaths and much suffering.

I have attempted to show that the purulent nature of the reaccumulated fluid may not perhaps be due to external influences, but rather to forces acting internally, and upsetting the equilibrium of the patient's nervous mechanism. I have also pointed out that in those cases in which the effusions remain serous throughout, how very injurious the repeated abstraction of such large quantities of albumen as are contained in the pleural fluid must be to the general health of the patient. But the great and insuperable objection to the operation is that, while it brings with it great and varied dangers to the patient, it has no remedial effect upon the disease; the pleuritis remains unaltered, the operation merely aiming at the relief of some of its symptoms; if those symptoms are so urgent that death appears imminent, no doubt the operation of tapping is justifiable, nay, necessary; but, if the effusion is not so excessive as to cause these urgent symptoms,

what good, it may be fairly asked, have we done our patient, by practising Thoracentesis? We have removed a large quantity of albumen from him, we have made him run the risk of death from shock, the probability of empyema, but we have done nothing to cure him of Pleuritis. I feel greatly supported in the opinions I have ventured to express with regard to the propriety of performing Thoracentesis, by finding Becker and Thompson, each of whom have, in years past, been ardent advocates of the practice of Thoracentesis, subsequently recanting, and each of them declaring, that in their opinion Thoracentesis ought never to be practised, on account of the great dangers attending it, except in those urgent cases where death is imminent.

Before concluding my remarks on the subject of Thoracentesis, I would refer to some interesting facts which appear to bear directly on the view I have taken on this subject in this treatise.¹

At a meeting of the Lyons Medical Society, M. Besnier stated that the mortality from Pleurisy in Paris had doubled within the last six years, and he enquired how far this increased mortality was due to the practice of Thoracentesis, which had been largely resorted to in Paris during the period stated; while, on the other hand, Clement, at the same meeting, shewed that the mortality in the military hospitals in Paris, where the treatment was exclusively medicinal, had, during the same period, remained at its usual low level.

These facts speak so eloquently against the practice of Thoracentesis, that no comment on them appears necessary.

PART II.

In discussing, as the main topic of this thesis, the subject of Thoracentesis for the relief of Pleurisy with effusion, I have been led to compare its therapeutic value with other methods of treatment. I have hitherto purposely avoided complicating the discussion, by alluding to these other methods of treatment in detail; but it will now be proper at this place to specify, and briefly consider some of the more important of them. They may all be comprehended under the following:---

1. *Antiphlogistic treatment.*

¹ Medical Times and Gazette, vol. i. 1874, page 247.

2. *Treatment by Deobstruents, Diuretics, Counter Irritants.*
3. *Diaphoretic treatment.*
4. *Schroth's method of treatment.*
5. *And lastly, a plan of treatment I venture to suggest, namely, the employment of the interrupted current.*

(1.) *Antiphlogistic Treatment.*

The old routine practice in Pleurisy was by means of severe blood-letting, followed up by diuretics and mercury. And undoubtedly the results were often extremely good and the recoveries extremely rapid. Take, for instance, Case 18 in the Appendix.—Could any modern treatment shew a better or more rapid cure? In this case we find a man with his left side full of fluid, and the inter-costal spaces bulged. He was freely bled, blistered, given mercury and diuretics. He was discharged from hospital in twenty-one days, and the note adds, “percussion note resonant, free respiration was heard over the whole chest.” It is important to note that the patient had been ill a whole month before he went to hospital, for this is just one of those cases in which its advocates would have pressed for Thoracentesis. But I doubt even if the operation had been successful, whether the patient could possibly have left hospital sooner than he did, so that in this case at any rate Thoracentesis could have conferred no benefit on the patient which he did not derive equally from other treatment. Yet, while the employed treatment exposed the patient to no latent dangers, the surgical treatment might have lighted up in him an empyema.

In the Appendix will be seen several cases which were treated with good results by blood-letting, &c. Nevertheless in spite of frequent good results, the practice of general blood-letting in the treatment of Pleuritis has in the present day fallen into general discredit, and Niemeyer may be taken as expressing a generally received opinion when he says,¹ “I am convinced it neither cuts short the malady nor prevents the effusion.”

Walshe,² however, rather advocates venesection in healthy adults, and so to a certain extent does Fraentzel.³

But Bartholow condemns the practice.

¹ “Practice of Medicine,” vol. i., page 282.

² “Diseases of Chest,” page 276.

³ Ziemssen’s “Cyclopædia,” vol. iv., page 685.

(2.) *Treatment by Deobstruents and Counter Irritants.*

Most writers appear to agree that blistering is followed by good results. Some apply a large blister, but there is a certain amount of danger in this. A large blister is very apt to give rise to severe strangury which is sometimes more painful than the Pleurisy itself, and at all events greatly adds to the patient's distress. This undesirable occurrence does not appear, so far as I can discover, so likely to follow the application of small blisters which have the additional advantage of causing less annoyance to the patient. The internal administration of mercury, diuretics, and purgatives is strongly supported by many writers, and as strongly reprobated by others.

Bristowe¹ goes so far as to say that all these drugs are practically useless, and recommends the exhibition of tonics.

Dr Clifford Allbutt² appears to be much of the same opinion. Bartholow in his above quoted work also repudiates the use of mercury. But surely mercury has some action besides the poisonous one, with which alone some writers appear inclined to credit it? In syphilitic Iritis, for instance, does not the therapeutic action of mercury undoubtedly make itself apparent? And if we believe that it in some way *aids* in getting rid of the productions of inflammation in this disease, may we not also believe that it aids in getting rid of the productions of inflammation in the pleural cavity?

I give in the Appendix several cases, recorded by various writers, of Pleuritis with effusion treated with mercury, diuretics, and blisters, and I think the results will compare most favourably with those following Thoracentesis. Take for instance "Case 27" in Appendix in which on the 19th December the effusion reached to the second rib, and we find that the patient left the hospital restored to health on the 17th of the next month—that is in twenty-nine days after the commencement of treatment. Do not such cases justify the boast of the late Dr Gairdner³ that "nothing could have been done by Thoracentesis in these cases, which was not done by remedies with more than equal safety, and nearly equal rapidity?"

Amongst diuretics digitalis has long held, and deservedly, a

¹ "Practice of Medicine," page 395.

² "Medical Times and Gazette," vol. i. 1874, page 497.

³ "Lancet," vol. i. 1861, page 453.

high place. On the 16th March 1785 Dr Erasmus Darwin read a paper¹ at a meeting of the Royal College of Physicians of London, in which he advocated the use of this drug for the purpose of getting rid of fluids in any of the body cavities, and it has been used as a diuretic ever since.

(3). *Diaphoretic Treatment.*

In this mode of treatment one of the most potent drugs is, the recently introduced, jaborandi, which is not only a diaphoretic but likewise a sialagogue. Dr Brakenridge relates a case² which he treated successfully by the exhibition of jaborandi. And in the same journal,³ Dr Gasset, of Montpelier, says that his experience of the value of jaborandi after using it in five cases is that, (1) jaborandi is very useful in treatment of pleuritic effusions, whatever may be their date or amount; (2) It usually causes the rapid disappearance of the liquid and the production of pleural friction sounds; (3) The effects of jaborandi are of short duration, so that the liquid is often reproduced with great rapidity, but usually the definite disappearance of the fluid will be obtained; (4) But where the disappearance has been obtained, and the pleural friction sounds appear, then jaborandi becomes inefficacious, and must be discontinued.

Bartholow⁴ also recommends the exhibition of jaborandi.

An effect similar to that of diaphoretics has been sought to be obtained by the action of drastic purgatives. This plan was employed by Sydenham for the treatment of pleuritic effusions. But as Niemeyer very properly points out⁵ "the pernicious effect of drastics, upon the digestion and assimilation forms a serious objection to their employment." It is very interesting to note in this connection that, as related by Lænnec, Paracelsus treated this stage of Pleurisy by sudorifics, and application of cow dung. This latter agent appears to be employed by the Brahmins in all cases of difficulty.⁶

(4). *Schroth's Method of Treatment.*

In his method of treatment Schroth conceived the idea of producing inspissation of the blood by diminishing the supply of

¹ "Medical Transactions," vol. iii., page 255.

² "Medical Times and Gazette," vol. ii. 1875, page 583.

³ "Medical Times and Gazette," vol. i. 1876, page 493.

⁴ "Practice of Medicine," page 317. ⁵ "Practice of Medicine," page 283.

⁶ See Macdonald's "History of Medicine," page 64.

water coming to it. Niemeyer relates one case which he saw treated successfully by this method.¹

Dr Moxon, of Guy's Hospital, relates a remarkable case,² of a patient with an enormous collection of fluid in the pleural cavity, who had been ill for three months, and in whose pleural cavity all signs of fluid had disappeared by the middle of the third week of treatment. Fraentzel also says that he has known very good results follow this mode of treatment.³

Numerous other methods of treating Pleurisy with effusion have been suggested. I shall only for the sake of illustration refer to two.

(1). Tannic acid has been advocated by Dr Duboné. He declares that in the cases treated by means of this therapeutic agent cure resulted in a space of time varying from twelve days to five weeks. But apparently only four cases were thus treated.

The dose he used varied from 10 to 25 grains *per diem*.⁴

(2.) The other method is that now very commonly resorted to in certain stages of the disease, namely—*strapping the chest* by means of adhesive plasters, so as to secure as far as possible complete physiological rest to the one side of the thorax.

This plan was first proposed by Mr J. Hilton,⁵ and has since been carried out by Dr F. T. Roberts.⁶

(5). *Treatment by Electricity.*

There appear to be strong reasons for believing⁷ that the pleuritic fluid should rather be called a collection than an effusion, for the normal pleuræ are constantly pouring forth immense quantities of fluid which are as constantly absorbed. Lehman having collected, from the pericardium of a man, in three-and-a-half minutes, nine-and-a-half drachms of fluid: equal to one-and-a-half gallon in the 24 hours (and I believe there is no reason for supposing that the pericardium secretes its fluid more rapidly than the pleuræ). Therefore it would seem as if the power of absorbing the effused fluid which collects after Pleuritis had been by some means interfered with.

Some writers⁸ appear to believe that the large quantity of the pleural effusion by its pressure causes a paralysis of the absorbents.

¹ "Practice of Medicine," page 284.

² "Medical Times and Gazette," vol. i. 1872, page 7.

³ Ziemssen's "Cyclopædia," vol. iv., page 691.

⁴ "Lancet," vol. i. 1873, page 71. ⁵ "Lectures on Chest and Pain."

⁶ "Hand-book of Medicine."

⁷ "Medical Times and Gazette," vol. i. 1862, page 127.

⁸ See Fraentzel's Article on Pleurisy: Ziemssen's "Cyclopædia," vol. iv., page 696.

This theory is surely contradicted by the fact that very enormous effusions are often quickly absorbed; and also, that we find the want of absorbing power shown in cases of effusion which are not large, not higher for instance than the angle of the scapula; and such effusions, though serious, cannot be called very enormous.

But an experiment by Richardson,¹ in which he injected a very large quantity of fluid into the peritoneal cavity of an animal, and which was immediately absorbed, tends to support my belief that the continuance of an effusion in the pleural cavity is the result of some alteration in the function of the absorbents, and is not due to the pressure of the fluid, in the pleural cavity, upon the absorbents.

Dybkowski's researches into the anatomy of the pleural membranes have shown that the portions of the pleura which cover the diaphragm, mediastinum, and lung are relatively poor in lymph vessels; on the other hand, the costal pleuræ is particularly rich in these vessels.²

Dybkowski further points out that the pleural membrane consists chiefly of a single layer of epithelial cells, in immediate juxtaposition to each other, and of a sub-epithelial layer, called the basement membrane. "This basement membrane is a delicate network of connective tissue, and its interstices are occupied by capillary blood-vessels, and by the ultimate ramifications of the lymphatics. The open work among the meshes of the basement membrane, therefore, is called the lymph spaces. The lymph vessels do not open directly into the spaces, but form a closed tubular system, like the hæmatic capillaries. The epithelial cells, however, which form the walls of these minute vessels, are more or less spherical, and, consequently, as they lie in contact with each other, they leave little cellular spaces called stomata, which afford communication between the lymph spaces without, and the interior of the lymph canals."

He also shows that the lymph spaces communicate with the pleural cavity, by means of the intercellular openings in the pleural epithelium.

He injected a coloured solution into the pleural cavity of a dog, and after two or three hours, he found the lymph vessels full of the injection. The absorbing force was sufficient, not

¹ "Medical Times and Gazette," vol. i. 1862, page 127.

² "Pneumono Dynamics" by Professor Garland, page 124.

only to draw fluid into the vessels, but also to take in solid particles of colouring matter. No absorption took place, however, if the animal was killed immediately after the injection. He inferred from these results that the muscular acts of respiration must have some influence upon absorption, and he explains his theory as follows:—"The lymphatics in the pleural membrane are situated between two forces, acting in opposite directions, namely, the elastic lung on one side, and the intercostal muscles on the other. During expiration the intercostals bulge into the chest; during inspiration, however, these muscles contract and straighten, and thus exert a traction from within outwards, upon the pleural membrane and its contained vessels; at the same time, the elasticity of the lung exerts a traction in the opposite direction. This antagonism of these two forces tends to pull the different layers of the pleura apart, and as the walls of the lymph vessels are in close connection with the framework of the basement membrane, it also tends to separate those walls, and to form a vacuum within the same. The moment this condition of affairs is established, the fluid within the pleural cavity, whether it be the result of a natural secretion of that cavity, or of a pathological exudation, rushes through the stomata above described, and occupies the space formed. When expiration occurs again, the parts return to their former position, and the fluid absorbed is crowded along the lymph vessels to remoter parts, whence it is prevented from returning by the abundant valvular armament of the vessels."

As indirect evidence of the correctness of his theory, Dybkowsky points out that those parts of the costal pleuræ which cover the intercostal muscles are very rich in lymph vessels, whereas other parts of the pleuræ are almost destitute of them. Dybkowsky also found that very little fluid and no solid particles were absorbed during quiet inspiration; on the other hand, if means were taken to produce an abrupt, jerking inspiration, the absorption was proportionately great.

Dybkowsky also enclosed a dog's head in an air chamber and rarefied the air. The intercostal spaces were exceedingly depressed, and each act of inspiration was accomplished only by a powerful initiatory jerk. The absorption was excessive. When he reversed the operation and allowed the animal to breathe in a chamber of compressed air, the intercostals bulged during expiration and retracted during inspiration. The conditions here were

so that no antagonism between the intercostals and the lung was possible, and no absorption took place.

Now it seems highly probable that in all pleural effusions the intercostal muscles in the region of the effusion lose somewhat of their tonicity; in large effusions we know they do, and that this loss of tone is carried a step farther, so that the intercostal grooves become obliterated by the muscles not only losing their tone, but becoming more or less paralysed; in some cases they even become bulged outwards. Do not Dybkowsky's experiments and anatomical researches appear to teach us that the non-absorption of a pleuritic effusion is due to this loss of tone in the intercostal muscles. This want of power in the muscles prevents the normal action of the stomata, in the lymph vessels, from coming into play, a state of things which has been wrongly spoken of as paralysis of the absorbents; but we have seen that the normal action of the stomata is, in all probability, only a passive action, and that it is really the intercostals that do the work by pumping the fluid into the former.

The advocates of Thoracentesis, at present, particularly insist that only a portion of the fluid in the pleural cavity should be drawn off by the operator; and that then the remaining fluid is quickly absorbed. They say the results of this mode of practice are very good.

They explain this by saying that the absorbents, paralysed by the pressure of the fluid, again resume their function when some of the fluid is drawn off; and can then do their work in absorbing the remainder of the fluid.¹

We have seen that most likely the absorbents are really not at fault at all, and that the vice most likely lies in loss of tone of the intercostal muscles.

I venture to suggest, therefore, that when the inflammation of the Pleuritis has passed away, an interrupted current should be applied to the intercostal muscles, in the region of the effusion, in order to cause them to contract powerfully, and thus bring their normal pumping action on the stomata into play.

The results obtained by the operation of Thoracentesis in large effusions, where a small portion of the fluid only is removed, seem to justify the mode of treatment I have just recommended; because, I believe, that by the removal of a portion of the fluid, the intercostals probably regain somewhat of their normal

¹ Fraentzel, page 696 of Ziemssen's "Cyclopædia," vol. iv.

contractility, and at once resume their pumping action on the stomata.

And as I believe these results of Thoracentesis add weight to my arguments in favour of electricity in the treatment of pleuritic effusion, I therefore claim them as arguments against the general practice of Thoracentesis ; a practice which I have formerly shewn to be attended by grave danger, and which I have now attempted to show is (if the researches of Dybkowsky are correct) advocated from an imperfect knowledge of the mode in which the absorbents of the pleuræ perform their normal functions.

Having completed my review of the different modes of treating Pleurisy with effusion, it only remains for me, after a careful study of the records of a great many clinical cases, some of which are brought together in the Appendix, to say that I believe—

I. No particular form of treatment is so invariably, and so pre-eminently successful as to deserve to be considered the best treatment of Pleurisy.

II. The proper treatment of this, as of every disease, is that which is dictated by a careful consideration of all the phenomena presented by each particular case, and the constitutional conditions of each particular patient.

RECORD OF CLINICAL CASES.

Death following Thoracentesis.

(1). *Medical Times and Gazette*, vol. ii. 1875, page 664.—Reynaud related a case before a French society of a rheumatic patient on whom Thoracentesis was performed, and who died a quarter of an hour after the operation. The post mortem examination revealed no cause of death, which was therefore attributed to reflex nervous action.

Death.

At the same meeting Lepine mentioned two deaths which occurred after Thoracentesis, but no particulars were given in the English journal.

Death.

(2). *Lancet*, vol. ii., 1876.—Dr Broadbent related to the Clinical Society of London the case of a patient, sixty-two years of age, on whom Thoracentesis was performed (by aspiration) at 2 P.M. 80 ounces of serum were drawn off to the great relief

Death.

of the patient. Patient was well at 5 P.M. and had his tea. At 5.45 it was observed that he was lying very still. It was found that he was *dead*.

Post-mortem examination showed nothing whatever to account for death.

(3). *Medical Times and Gazette*, vol. i. 1864, page 429.—At a meeting of the Société Médicale des Hôpitaux several deaths from Thoracentesis were recorded, but no particulars are related in the English journal.

(4). *Medical Times and Gazette*, vol. ii. 1875, page 169.—Dr Besnier related the following to the Société Médicale des Hôpitaux :—

Sudden
death.

Case of a lady, forty-three years of age. On 19th June she was found to be suffering from a very large pleuritic effusion on right side.

There was no cardiac lesion.

On 21st June dyspnœa had increased, and Thoracentesis was performed. She did not complain of pain during the puncture. Between 300 and 400 grammes of horribly fetid pus had been discharged, when it was suddenly noticed that respiration had ceased.

The *patient* was *dead*.

Besnier believed that death was due to nervous shock.

(5). In same journal as the last case, at page 382, Legrou reported to same Society the case of a patient, fifty-two years of age, who had suffered from an immense effusion into the pleural cavity—he had been ill one month.

Sudden.
death

Thoracentesis was performed, and two litres had been discharged to patient's great relief. After coughing and speaking quietly for a while, he complained of faintness, and suddenly died.

The *autopsy* furnished *no explanation* of why death had occurred. Legrou therefore concluded that death was due to *Syncope*.

Convulsions following Thoracentesis.

(6). *Medical Times and Gazette*, vol. ii., 1875, page 664.—Vallin reported, in the *Gazette des Hôpitaux*, the case of a man, twenty-three years of age, who had been ill with Pleurisy for a month. Symptoms appeared to demand Thoracentesis. Operation gave great relief; but effusion recurring, a drainage tube

was inserted, and the pleural cavity was washed out daily with weak carbolic acid solutions. During one of these washings out the patient complained of slight pain, and at the end of the washing out he fainted, the limbs became stiff, the extremities cold, face cyanosed, pulse small. After three quarters of an hour Opisthotonos came on, and twelve hours after the onset of the attack, the man died without any return to consciousness. At the autopsy nothing was found to account for death; there was, however, fatty degeneration of the heart.

(7). *Medical Times and Gazette*, vol. ii., 1876, page 557.—Dr Williams related to the Clinical Society of London, the case of a child on whom Thoracentesis had been performed and pus evacuated. The cavity was washed out daily, and a drainage tube was worn "for months." The lung expanded. One day the child was seized with insensibility, one-sided convulsions, and finally died comatose. No post-mortem examination was allowed in this case.

Convulsions following Thoracentesis and also Conversion of Serum into Pus.

(8). *Medical Times and Gazette*, vol. ii., 1876, page 557.—Dr Cayley related to the Clinical Society of London a case of a patient 36 years of age on whom Thoracentesis was performed in the Middlesex Hospital on account of an effusion in right pleural cavity—23 ounces of serum were drawn off by the aspirator; six days later patient again tapped in two places, and six ounces of bloody serum drawn off from each spot; eight days later tapped again, and twelve ounces of fetid pus withdrawn. The pleural cavity was now washed out daily with a weak solution of iodine; great improvement took place in patient's condition, he began to put on flesh. The tenth time that the pleural cavity was washed out while the solution was being injected, patient suddenly became pale, pulse slow, breathing gasping, pupils dilated, followed first by rigidity and then by general convulsions; temperature ran up to 107° and he remained comatose till death, which occurred in 16 hours. At the *post-mortem* examination nothing whatever was found to account for death.

Dr Cayley then referred to three similar cases which occurred in France. In the first, death supervened in six hours. In the second case, the convulsions passed off; but on the washing out

of the pleural cavity being resumed they returned, and death ensued. In the third case, the convulsions passed off, treatment was resumed, and the patient finally recovered. In the two cases that ended fatally, the autopsy revealed no cause to account for death. The nature of the fluid injected did not appear to matter. For in the different cases, water, iodine solution, carbolic acid, and alcohol had each been employed. In all the cases the pleural cavities had many times been washed out with impunity. In one case daily for three months.

Death from Bronchitis following Thoracentesis.

(9). *Medical Times and Gazette*, vol. i., 1872, page 421.—Dr Charles Williams mentioned in the course of a lecture before the Royal College of Physicians a case of severe bronchitis, causing death, which came on in a patient two days after Thoracentesis had been performed. Dr Williams stated that he believed the bronchitis was produced by the sudden access of air into a previously collapsed lung.

Cure of a Deformity of Side.

(10). *Medical Times and Gazette*, vol. , 1854, page 13.—Case of T. T., aged 12. Admitted into hospital 27th February 1852.

Examination.—On percussion, dullness was found all over the left side except for $1\frac{1}{2}$ inch below the clavicle. At this spot harsh breathing was heard. No respiratory sound could be heard over the remainder of the left side. No cough ; pulse 144.

The lower portion of the sternum was prominent. The left shoulder drooped ; the left chest was contracted, and there was a slight lateral curvature of the spine.

Right side $1\frac{1}{4}$ inch greater in measurement than the left side.

History.—Had suffered from dyspnœa and pain in side for six months, with occasional exacerbation of symptoms.

Treatment.—Principally cod oil and country air.

The boy was again examined after two years. He was in perfect health. Respiratory murmur normal all over the left side, and both sides acted equally in respiration. The right side of the chest was however an inch larger than the left.

Deformity of Chest cured in Five Months.

(11). *Lancet*, vol. i., 1868, page 338.—Dr Buchanan, in his “Lettsonian Lectures,” relates :—

Case of boy, seven years of age, subject of a right pleuritic effusion. Thoracentesis was performed and he did well. But the side “greatly contracted”—the right side measured $10\frac{3}{4}$ inches and the left side $12\frac{3}{8}$ inches.

He was sent to the country, and he was seen five months afterwards quite well, and there was a great reduction in the deformity of the chest.

Disappearance of Chest Deformity.

(12). *Medical Times and Gazette*, vol. i., 1872, page 421.—Dr Charles Williams mentions :—

Case of a young lady, fourteen years of age, suffering from right pleurisy with effusion. Thoracentesis was performed—cure resulted, leaving contraction of the side.

This deformity entirely disappeared within a space of *two years*.

(13). Again he relates case of a boy ten years old, through whose side an empyema burst. Cure finally resulted—but side contracted, causing deformity.

In two years, however, the side had almost entirely regained its normal dimensions ; and “the lungs were pervious throughout.”

Conversion of Serous into a Purulent Effusion by Thoracentesis.

(14). From the *Medical Times and Gazette*, vol. ., 1854.—Case of W. S., age twenty-six. The patient was the subject of pulmonary phthisis. On the 22nd January Pleurisy supervened—by 12th of February all acute symptoms had passed off ; the general health improved, but resolution of the fluid was but slight ; therefore, on 26th February Thoracentesis was performed, and serum was withdrawn.

Serum
turned
into pus.

By some day (not mentioned) in March, Thoracentesis had again to be performed, and a quantity of pus was withdrawn ; the effusion continued purulent for two months. The side contracted. When the patient left hospital in August, the percussion note was still dull.

Deformity
of side.

Case shewing that a patient may have an effusion in pleural cavity for six months, *and yet the lung was not bound down.*

Conversion of Serous Effusion into an Empyema by Thoracentesis.

(15). *British Medical Journal*, 12th Nov. 1881, page 773.—Mr Edward Thompson relates:—

Case of J. D., of the Irish Constabulary, admitted into hospital 8th December 1874. In previous June had been suddenly seized with severe pain in the side; was supposed to be suffering from an aneurism.

Examination revealed the existence of a very large effusion in the left pleural cavity, apex beat of the heart was felt an inch to the right of the right nipple. Thoracentesis was performed, and 108 ounces of *serous fluid* were drawn off—rapid improvement followed. But fluid reaccumulated, and on 5th January Thoracentesis was again performed, and 168 ounces of *purulent fluid* were drawn off. The patient recovered after this; there was some retraction of the side.

J. D. was seen by Mr Thompson two years after this—he was in good health, and again doing duty as a constabulary officer.

Conversion of Serum into Pus.

(16.) *Medical Times and Gazette*, vol. ii., 1875, page 680.—Case of George P., aged 12 years, suffered from Pleurisy with effusion of right side. Thoracentesis performed at end of June, and 50 ounces of clear serum drawn off with the aspirator.

On 8th August chest was again tapped and 51 ounces of purulent fluid drawn off. On 11th September was again tapped and 50 ounces of pus drawn off. After repeated tappings the patient finally *died* of exhaustion on 11th November.

Death.

Non-absorbed Effusion, but Health of Patient good after nine months.

(17.) *Medical Times and Gazette*, vol. ., 1854, page 10.—Thomas March, age 15, admitted into St Bartholomew's Hospital, 23rd April 1853.

Examination shewed that right pleural cavity was full of fluid

There was no fever or dyspnoea, there was slight duskiness of complexion.

History of case.—Patient had been able to do no work for nine weeks before admission into hospital on account of shortness of breath. And when he first began to feel shortness of breath he had also complained of a slight pain in the back.

During his stay in hospital he suffered from an attack of scarlet fever, but from this he soon recovered and was soon able to be about. He was able to walk up and down stairs without any inconvenience. But the fluid did not become absorbed. He was finally discharged. He was seen nine months after his discharge from the hospital, he was in good health, and able for light work. But the fluid in the pleural sac had not diminished.

Treatment by Cupping, Mercurials, Diuretics.

(18.) *Medical Times and Gazette*, vol. ., 1854, page 11 .
—Case of W. P., age 23, admitted in hospital on 5th July.

Examination shewed that the *left side* was *full of fluid* and was bulged outwards. The patient suffered from Orthopnoea.

History.—A month previous to admission into hospital he had been seized with severe stitch in side.

Treatment.—Cupping to 8 ounces. Grey powder every six hours, and a blister to side. On third day another blister, and on fifth day another blister. Diuretics now were commenced, and exhibition of mercury was stopped. Patient was discharged from hospital on 25th July perfectly well. The note adds percussion resonant and free respiration heard over the whole chest, but vocal fremitus was not quite so distinct as on the right side. Cure in 20 days.

Treatment by Cupping, Mercurials, and Blisters.

(19.) *Medical Times and Gazette*, vol. ., 1854, page 12.
—Case of R. S., age 30. Admitted into hospital the 11th October.

Examination shewed the presence of a pleuritic effusion on the left side. Dullness extended over the *whole side*, and respiratory murmur absent except at apex. Left chest *was bulged out.*—Pulse was 104.

History.—Patient had been ill for five weeks and acutely ill for three days.

Treatment.—Cupping to ten ounces, repeated blisters, calomel and opium, thrice daily.

After treatment for a month, patient had a slight relapse ; but after two months residence in hospital, the patient was discharged. When discharged, there was no fluid in the pleural cavity, and there was no contraction of the side.

Cure in 60 days.

Treatment—Leeches, Mercurials, Salines.

(20). *Medical Times and Gazette*, vol. 1854, page 13.—Case of E. E. Admitted into hospital 21st July 1853, aged seven years.

Examination revealed Pleurisy of right side, with effusion, as high as the *right nipple*.

History.—Attack had been sudden and attended by fever.

Treatment.—Six leeches were applied to the side, and internally, mercurials and salines were given.

Cure in 11 days.

Absorption was complete on August 1.

(21). From *Medical Times and Gazette*, vol. 1854, page 14.—Case of Harriet S., aged twenty-eight. Admitted into hospital 2d December 1851.

Examination showed that the left pleura was full of *fluid up to the lower border of the 2d rib*. The heart was pushed to the right side. Right lung was healthy ; left side measured an inch more than the right. Pulse was 108.

Treatment.—Cupping to eight ounces, antimony, calomel, and opium, repeated blisters, iodide of potassium and diuretics.

History of Case.—Patient had been ill for three weeks before admission with pain in the side and shiverings.

After three months the patient was discharged with a clear percussion note as low as the nipple. The patient was seen two years after leaving hospital. She was in perfect health. At no time had the side contracted at all.

Cure in 20 days.

Treatment—Blood-letting, Mercurials.

(22). *Medical Times and Gazette*, vol. xvi. 1858, page 477, reported by Dr Hamilton Roe.—Case of Mrs E. L., age twenty-eight. A strong, healthy woman, nurse to Westminster Hospital.

Examination.—Sharp pain on left side, which was increased on inspiration. Lower part of left side dull on percussion ; respiratory murmur indistinctly heard.

History.—Attack had been sharp and sudden.

Treatment.—20 ounces of blood taken from the arm. Calomel 2 grains, opium $\frac{1}{2}$ grain, every four hours. Next day breathing was more difficult, she could not lie down, *dullness extended up to the clavicle*. Bled to 16 ounces; 1 grain digitalis and $\frac{1}{4}$ grain tart. antimony added to former mixture of calomel and opium. Next day she was salivated. Improvement now rapidly set in, and in less than fourteen days from her admission, all signs of fluid had disappeared from the pleural cavity. Patient was now convalescent, and very soon resumed her duties in the hospital. 14 days.

Treatment by Blisters and Diuretics.

(23). *Medical Times and Gazette*, vol. 1854, page 10.—Case of Sarah Riley, a pale, delicate woman, aged twenty-eight, who was admitted into St Bartholomew's Hospital, under the care of Dr Burrows, on 20th September 1852. On examination, fluid was found in the right pleural cavity as *high as the 3d rib*. Below the 3d rib *percussion was quite DULL*. Above the 3d rib percussion note was clear, and respiratory sounds were distinct but harsh. Below the level of the 3d rib, no respiratory sounds could be heard. Vocal fremitus was abolished. The right side of diaphragm was depressed—evidence of this shown by a bulging in the right hypochondrium below, over site of this bulging, percussion note was dull. There was a sense of fluctuation at this point. The left side of the chest appeared to be quite healthy.

Dyspnœa not very urgent. But the face was congested and dusky. Pulse 100. Respirations 24. Measurement shewed right side was $1\frac{1}{2}$ inch wider than left below the nipples.

There was a history of an old Pleurisy of same side, and pricking pains had been repeatedly experienced since; when admitted into hospital the patient had been ill a month.

Cure in 32 days.

Treatment—*Nitrate of Potash*, *Nitric Ether*. Infusion of DIGITALIS and repeated BLISTERS.

Patient returned to her work 23rd October. There was still fluid at base of lung, and side was $1\frac{1}{8}$ inch greater than the left side; by Christmas, four months after the commencement of the illness, absorption was complete, and the lung had quite recovered itself.

Treatment by Mercurials and Blisters.

(24.) *Medical Times and Gazette*, vol. i., 1854, continued from page 10.—Ada M. admitted into hospital 9th October.

History of case.—Three weeks after her confinement she had had a rigor. As she felt very unwell she came to hospital for advice, and was admitted on 10th day of her illness (*i.e.* 10th day after the rigor.)

Examination shewed patient was suffering from pleuro-pneumonia of the left side, the fluid in the pleural cavity reached to the level of the fourth rib.

Treatment.—Pulv. Hydrarg. c. Creta gr. iij., four times daily, and repeated blisters. Patient was discharged from hospital on 25th October, that is sixteen days after admission, perfectly well.

Cure in 16 days.

(25.) From *Medical Times and Gazette*, vol. ., 1854, page . S. L., age 34, admitted into hospital 31st May.

Examination.—Pulse 120. Whole of left side was dull on percussion, and was found to be full of fluid. Heart was pushed one inch to right of sternum. The left side measured $1\frac{1}{4}$ inch more than the right side.

History.—For two weeks previous to her admission she had suffered from stitch in the left side and chills.

Treatment.—Cupping, calomel and opium, and antimony; on 4th June left side had diminished $\frac{1}{4}$ inch from its previous measurement.

Blisters were now ordered, and diuretics and iodide of potassium, later on cod oil, and chest was strapped.

Cure in 49 days.

Patient was discharged from hospital on 19th July perfectly well and fluid entirely absorbed (absorption was complete forty-nine days after admission into hospital).

Treatment, Blisters, Mercurials, Diuretics.

(26.) *Medical Times and Gazette*, vol. ., 1854, page 12.—Case of G. H., admitted into hospital on 14th September.

Examination showed that patient was suffering from pleuro-pneumonia of the left side, and there was complete dullness over the lower two-thirds of the left side.

History.—Patient had been seized with a rigor, followed with pain in the chest and dyspnoea on 11th September.

Treatment.—Blisters, grey powder thrice daily with antimony.

Patient was dismissed from hospital on the 22nd September perfectly well. Cure in 7 days.

(27.) Case of J. B., aged 33, admitted into hospital 19th December 1851.

Examination shewed that pleuritic effusion was present, and that it reached to the level of *second rib* (record omits to say on which side the effusion existed.)

History.—Patient had been ill for three weeks before admission in hospital.

Treatment.—Mercury and opium to ptyalism, salines, diuretics, and counter irritation externally. Patient was dismissed from hospital quite convalescent on 17th January 1852. Cure in 29 days.

Treatment by Mercurials and Diuretics.

(28.) *Medical Times and Gazette*, vol. ., 1854, page 10.
—Cornelia C., aged 20. Had been attended for two weeks previous to her admission into hospital on account of Pericarditis and Pleurisy. She was admitted into hospital on the 3rd September.

Examination shewed that the left pleura was *full of fluid* up to the margin of the second rib. The area of precordial dullness was also much extended.

Treatment.—*Calomel* and *Opium* pill thrice daily and *nitrate of potash* drink.

On 8th September the fluid had entirely disappeared from the pleural cavity. Cure in 5 days.

Patient was discharged from hospital on 20th September quite well.

Treatment by Blisters and Mercurials.

(29.) From *Medical Times and Gazette*, vol. . 1854, page 14.—Case of John G., twelve years of age, admitted into hospital, 15th November 1853.

Examination revealed *effusion* into the *right pleural cavity*, reaching as high as the *nipple line*.

History.—Patient had been ill for six days.

Treatment.—*Mercurials* and *Salines*, and Tincture of Iodine painted repeatedly over the side. 15 days.

Discharged quite well November 28th.

(30.) *From same Paper*.—Case of John B., aged twenty-eight, admitted into hospital 21st November 1853.

Examination revealed effusion in the right pleura up to the level of the nipple and loud friction above the *nipple line*. There was great general prostration.

14 days.

Treatment.—*Mercury* and *Opium*, quinine, blisters. Fluid was entirely absorbed in two weeks.

(31). *From same Paper*.—Case of T. P., age thirty-two. Admitted into hospital 9th May 1853.

Examination.—Left *pleural cavity* was almost full of fluid, and the side was bulged outwards.

History.—Patient had been ill for three weeks ; inflammatory symptoms had been slight.

Cure complete in 49 days.

Treatment.—*Mercury*, iodide of potassium. Blisters and painting side with tincture of iodine.

Patient was discharged from hospital in *seven weeks*. Absorption was complete, and air entered all parts of the lung.

Treatment by Blisters, Mercurials, Diuretics.

(32). *From Medical Times and Gazette*, vol. . 1854, page .—Case of B. B., age eighteen years. Admitted into hospital, 2nd June 1853.

Examination shewed that the left pleura was full of fluid—left side distended—heart's beat was felt beneath the right nipple. There was no dyspnoea except on exertion.

History.—For three weeks patient had felt rather languid and short of breath, but had continued at his work (a blacksmith) till day of admission into hospital.

Treatment.—*Mercury*, squill, salines, iodide potas., blisters.

20 days.

At the end of four months patient insisted on leaving hospital, as he felt quite well. Absorption was nearly complete. There was no retraction of the side.

(33). *From same Journal and same page*.—Case of G. P., admitted into hospital 18th May 1853,—aged eight years.

Examination.—Left pleura was full of fluid. Measurements of both sides the same. Heart's beat felt beneath the right nipple.

History.—Patient had been ill for a month with pain in side and shortness of breath, but he had continued at school till time of admission.

Treatment.—Counter irritation, diuretics, and iodide of potassium.

Resolution complete on 6th July—lung had completely recovered. There was no deformity of the chest.

70 days.

Treatment—Blisters.

(34). *Medical Times and Gazette*, vol. . 1854, page 10.—William B., age twenty-one, was admitted into St Bartholomew's Hospital.

Examination shewed that the *left pleura* was *full of fluid*, and the heart was pushed over to the right of the sternum.

History.—Patient's previous health had been robust. He had caught cold from sitting in an open railway carriage when in a state of profuse perspiration. Before the end of his railway journey, he had a rigor and felt a slight pricking in the chest. After this he had felt short of breath, but had kept on at his work till his admission into hospital.

Treatment.—Blisters, low diet, and internally, Liq. ammon. acetat. ʒ ij, Mist. camphor ʒ ss., every four hours.

Patient was discharged from hospital sixty days after his admission in perfect health, fluid entirely absorbed, and lungs perfectly healthy. Cure in 60 days.

Schroth's Method.

(35). *Medical Times and Gazette*, vol. i. 1872, page 5.—Reported by Dr Moxon :—

Case of W. G., age twenty-four, admitted into Guy's Hospital, 19th June.

Examination revealed a very large effusion in the right pleural cavity. Dullness was found on right side up to about the clavicle where the note was hollow. Dullness passed some distance to left of the median line. Apex beat of heart felt half an inch outside the left nipple—some difficulty in breathing.

History.—Had caught cold three months previously, and had since had pain in chest and some difficulty of breathing.

Treatment.— $\left\{ \begin{array}{l} \text{Pot. Iodid.} \\ \text{Pot. Chlorat } \bar{a} \bar{a} \text{ gr. V. ter in die,} \end{array} \right.$ and bitartrate of potash electuary. Restricted to 10 ounces of fluid in the 24 hours.

By the middle of the third week of treatment, all signs of fluid had disappeared from the pleural cavity.

Only im-
bibed ʒx
of fluid
daily.

3 weeks.

The two cases following were observed in *Ward 23 this winter*.

(36). Case of Mark M. Had been ill since April, and was a good deal off work. Came to Edinburgh in October 1881, and got work. Kept at work though it was difficult for him till his entrance into the Infirmary on 4th December 1881.

Examination shewed that the right limit of the heart's dullness was in the right mid axillary line. There was no breathlessness when the patient was at rest, and could not have been much when he exerted himself as he kept at work till admission into hospital.

(37). Henry P., age 18. Empyema—Thoracentesis performed on 12th February, and 50 ounces of pus drawn off. He died suddenly on 13th February.

Post-mortem examination. Right pleural cavity contained 170 ounces of thick pus, right lung collapsed but was not bound down by adhesions to any extent.

Heart.—Pericardial sac *continuously united* by *fibrous adhesions*.

(38). *Medical Times and Gazette*, vol. ii., 1876, page 258.
—Case of a labourer, age 38.

Thoracentesis was performed on 41st day of his stay in hospital and 62nd day of the disease. Forty-five ounces of serum were drawn off him. Patient subsequently died of Thrombosis.

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